A Tailorable Structural Composite for GCR and Albedo Neutron Protection on the Lunar Surface, Phase I

Completed Technology Project (2009 - 2009)

Project Introduction

A tailorable structural composite that will provide protection from the lunar radiation environment, including GCR and albedo neutrons will be developed. This composite will have increased structural strength combined with more efficient shielding of GCR and albedo neutrons when compared to previously developed composites, leading to increased TRL level. Boron coated fabric will be integrated precisely where it will have the most positive effect on shield characteristics (according to simulations and testing), providing an efficient and highly tailorable composite. A highly innovative processing method, Low Pressure Vacuum Plasma Spray (LPVPS), will be demonstrated during this effort to deposit a layer of boron containing natural abundance of 10B onto carbon fabric from the vapor phase. Benefits of this processing method include significantly higher deposition rates and through-put than PVD/CVD, significantly larger deposition footprint, and excellent quality control due to the exact nature of the deposition process. Composite strength will be increased by using carbon fabric as a carrier for the 10B, with bonding between the coated fabric and epoxy matrix enhanced through surface treatments. Thermal protection system incorporation for protection against temperature extremes and micrometeorite impact will be investigated during Phase 2.

Primary U.S. Work Locations and Key Partners

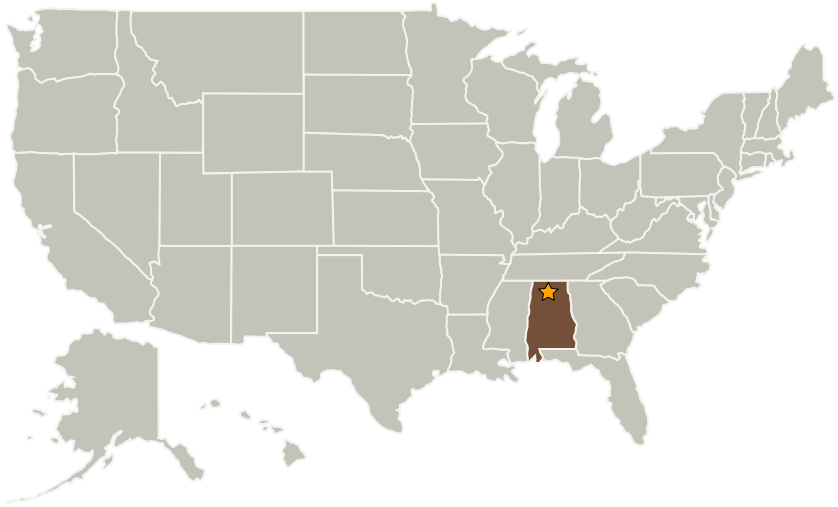

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Plasma Processes, LLC	Supporting Organization	Industry Veteran-Owned Small Business (VOSB)	Huntsville, Alabama

Primary U.S. Work Locations
Alabama

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.3 Thermal Protection Components and Systems
    - TX14.3.1 Thermal Protection Materials